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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/729,716

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Vijay Varadan

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EXAMINER

MCCRACKEN, DANIEL

ART UNIT

PAPER NUMBER

1754

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

03/30/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/729,716	Applicant(s) VARADAN ET AL.	
	Examiner Daniel C. McCracken	Art Unit 1754	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 January 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 and 21-73 is/are pending in the application.
- 4a) Of the above claim(s) 21-45 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 and 46-73 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-73 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 December 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Citation to the Specification will be in the following format (S. #, ¶) where # denotes the page number and ¶ denotes the paragraph number.

Election/Restrictions

Applicant's election without traverse of Claims 1-12 and 46-73 in the reply filed on 01/11/2007 is acknowledged. Claims 13-20 are now cancelled. Claims 21-45 stand withdrawn.

Drawings

New corrected drawings in compliance with 37 CFR 1.121(d) are required in this application because the SEM micrographs (Figs. 5-6) are unintelligible. Applicant is advised to employ the services of a competent patent draftsman outside the Office, as the U.S. Patent and Trademark Office no longer prepares new drawings. The corrected drawings are required in reply to the Office action to avoid abandonment of the application. The requirement for corrected drawings will not be held in abeyance.

Response to Arguments

Applicant's arguments filed 10/11/2006 have been fully considered but they are not persuasive.

With respect to the rejection of Claims 1-12 and 46-73 under 35 U.S.C. 102(a) as anticipated or, in the alternative, under 35 USC 103(a) as obvious over Biro et al., Applicants arguments can succinctly be summarized as: (1) Biro is not enabled, and (2) Biro does not disclose the claimed non-hexagonal to hexagonal carbon ring ratio.

As to the enablement issue raised by Applicants, one of ordinary skill in the art would presumably be familiar with synthesis techniques for carbon nanotubes. To the extent one of ordinary skill in the art would not be familiar with the synthesis techniques, Biro tells them exactly how it is done. *See* (Biro at 165405-5, "V. Conclusions") ("Coiled carbon nanotubes can

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be produced at high yield by catalytic CVD.”). Further, Biro identifies that “there are certain catalyst and reaction conditions, which enhance the formation of regularly coiled structures.” (Biro at 165405-5, second column) (citations omitted). Biro even provides guidance as to what temperatures to use. *Id.* In sum, Biro provides direction as to the synthesis technique (CVD versus arc discharge/Kratschmer-Huffman), provides ample citation to the literature, and identifies several result effective variables (catalyst, temperature). “[D]iscovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art.” *In re Boesch*, 205 USPQ 215, 219 (CCPA 1980) (citations omitted). It would appear that this is exactly what Applicants have done. *Compare* (Biro at 165405-5) *with* (S. 8, 14) (“The exact morphology of coiled carbon nanotubes will depend on the catalyst/catalyst support that is used and the conditions of the microwave CVD.”)

With respect to the issue regarding the claimed non-hexagonal to hexagonal carbon ring ratio, Applicants are reminded that this rejection was made under 35 U.S.C. §102 and alternatively under 35 U.S.C. §103. To the extent Biro does not disclose *in haec verba* a non-hexagonal/hexagonal ratio of 1:1, one of ordinary skill in the art would recognize language that states “n-Hx to Hx ratio *around or over* 1” would reasonably suggest a ratio of 1:1. (Biro at 165405-5) (emphasis added).

The Examiner appreciates Applicants’ statements regarding the differences between a coil or a Dunlap knee and a torus, but is of the position that Biro provides ample guidance to produce coiled nanotubes with the claimed ratio. Further, the Examiner notes that Applicants support for the claimed non-hexagonal to hexagonal ratio is little more than a guess, or perhaps a comparison to “theoretically predicted” carbon nanotube models. *See e.g.* (S. 8, 5-15) (“A non-hexagonal/hexagonal ratio of 0.1 produces a “loose” coil with a *large pitch*. A non-hexagonal/hexagonal ratio of 1:1 produces a “tight” coil with a *small pitch*.”) (emphasis added).

With respect to the rejection under 35 U.S.C. § 102(b) of Claims 46-73 as being anticipated by Volodin, et al., Figure 2 of Volodin appears to disclose a coiled nanotube of the claimed non-hexagonal/hexagonal ratio. *Compare* (Volodin at 3343 “Fig. 2”) *with* (S. “Fig 3”). “[T]he PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product. Whether the rejection is based on inherency’ under 35 U.S.C. 102, on prima facie obviousness’ under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted].” The burden of proof is similar to that required with respect to product-by-process claims. In re Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980) (quoting In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)). *See* Non-Final Office Action of 7/11/2006 with respect to product-by-process claims.

With respect to the rejections under 35 U.S.C. §§ 102-103 of Claims 1-12 and 46-73¹ as being anticipated or in the alternative obvious over Amelinckx et al, with respect to the non-hexagonal/hexagonal ratio limitation, it appears that Fig. 2B of Amelinckx discloses a coiled nanotube with the claimed non-hexagonal/hexagonal ratio. *Compare* (Amelinckx “Fig 1” and “Fig 2B”) *with* (S. “Fig 3”). “[T]he PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product. Whether the rejection is based on inherency’ under 35 U.S.C. 102, on prima facie obviousness’ under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted].” The burden of proof is similar to that required with respect to product-by-process claims. In re Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980) (quoting In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)). *See* Non-Final Office Action of 7/11/2006 with respect to product-by-process claims.

With respect to the rejections under 35 U.S.C. §§ 102-103 of Claims 1-12 and 46-73² as being anticipated or in the alternative obvious over Pan et al, with respect to the non-hexagonal/hexagonal ratio limitation, it appears that Fig. 2 of Pan discloses a coiled nanotube with the claimed non-hexagonal/hexagonal ratio. *Compare* (Pan “Fig 2”) *with* (S. “Fig 3”). “[T]he PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product. Whether the rejection is based on inherency’ under 35 U.S.C. 102, on prima facie obviousness’ under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted].” The burden of proof is similar to that required with respect to product-by-process claims. In re Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980) (quoting In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)). *See* Non-Final Office Action of 7/11/2006 with respect to product-by-process claims.

With respect to the rejections under 35 U.S.C. §§ 102-103 of Claims 1-12 and 46-73³ as being anticipated or in the alternative obvious over US 6,558,645, with respect to the non-hexagonal/hexagonal ratio limitation, it appears that Fig. 3 and Fig 6 of Nakayama discloses a coiled nanotube with the claimed non-hexagonal/hexagonal ratio. *Compare* (Nakayama “Fig 3” and “Fig 6”) *with* (S. “Fig 3”). “[T]he PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product. Whether the rejection is based on inherency’ under 35 U.S.C. 102, on prima facie obviousness’ under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted].” The burden of proof is similar to that required with respect to

¹ Claims 46-73 were rejected under 35 USC 102(b) only.

² Claims 46-73 were rejected under 35 USC 102(a) only.

product-by-process claims. In re Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980) (quoting In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)). See Non-Final Office Action of 7/11/2006 with respect to product-by-process claims.

Claim Rejections - 35 USC §§ 102-103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

The rejections of the Non-Final Office Action dated 07/11/2006 are expressly incorporated herein by reference. Those rejections mooted by cancellation of claims are withdrawn.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel C. McCracken whose telephone number is (571) 272-6537. The examiner can normally be reached on Monday through Friday, 9 AM - 6 PM EST.

³ Claims 46-73 were rejected under 35 USC 102(e) only.

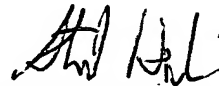
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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley S. Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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